

New records of *Scomberoides tala* (Cuvier, 1832), Barred Queenfish (Actinopterygii, Carangiformes, Carangidae), from southwestern Taiwan

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Abstract. Specimens of *Scomberoides tala* (Cuvier, 1832) were collected from southwestern Taiwan in the northwestern Pacific Ocean. While this species has been documented in other regions of the northwestern Pacific, our specimens mark its first recorded occurrence in Taiwan, bridging a previously identified distribution gap in this region. Additionally, we suggest that the distribution of this species may be shifting northward, potentially driven by global warming, as the northern records were reported rather recently.

Key words. Biodiversity, distribution, ichthyology, morphology, taxonomy

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INTRODUCTION

Species of the fish family Carangidae, commonly known as jacks or trevallies, are one of the most important families for commercial fisheries and inhabit coastal to oceanic waters worldwide (Smith-Vaniz 1999; Nelson et al. 2016). Currently, 39 genera and 152 species are recognized as valid (Kimura et al. 2013, 2022; Abdussamad et al. 2022; Fricke et al. 2024). Among the 39 genera, the genus *Scomberoides* Lacepède, 1801 can be distinguished from other genera in having: no caudal-peduncle grooves and scutes on lateral line; soft portion of anal-fin base as long as that of dorsal fin; semi-detached finlets on posterior portion of soft dorsal and anal fins; two rows of conical teeth separated by a shallow groove in adults (Smith-Vaniz 1999). Currently, five nominal species are recognized valid: *Scomberoides commersonnianus* Lacepède, 1801; *S. lysan* (Fabricius, 1775); *S. pelagicus* Abdussamad, Retheesh & Gopalakrishnan, 2022; *S. tala* (Cuvier, 1832); and *S. tol* (Cuvier, 1832). All these species are widely distributed in the Indo-West Pacific region, except for *S. pelagicus*, which is known from the Indian coast, Malaysia, South China Sea, and Manila Bay, the Philippines (Smith-Vaniz 1999, 2022; Abdussamad et al. 2022). So far, three species are known from Taiwanese waters, namely *S. commersonnianus*, *S. lysan*, and *S. tol* (Shen and Wu 2011; Hata 2019).

Recently, several queenfish specimens were collected from southwestern Taiwan in the northwestern Pacific Ocean. They were subsequently identified as *S. tala* based on the unique characters. Although this species has been recorded from adjacent region (e.g. Kimura 2017; Ogata et al. 2023), it has never been recorded from Taiwan. Herein, we document this new record to the Taiwanese ichthyofauna by providing detailed description of the specimens, as well as comparing to those data of other specimens.



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METHODS

Specimens were fixed in 4% formaldehyde, transferred to 70% ethanol for permanent preservation, and deposited in the Pisces Collection of the National Museum of Marine Biology and Aquarium, Pingtung, Taiwan (NMMB-P). The distribution map was generated from Ocean Data View (Schlitzer 2024).

Terminology and methodology follow Smith-Vaniz and Staiger (1973) and Ogata et al. (2023). Measurements were taken with calipers rounded to the nearest 0.1 mm, except for lengths more than 300 mm, which were taken using a regular ruler and rounding to the nearest 1 mm. Morphometric data are presented as ratios and/or percentages of fork length (FL) and head length (HL), unless specified otherwise. Data of other specimens were retrieved from Smith-Vaniz and Staiger (1973) and Ogata et al. (2023).

RESULTS

Family Carangidae
Subfamily Scomberoidinae

***Scomberoides tala* (Cuvier, 1832)**

New Chinese name: 橫紋逆鉤鰺

English name: Barred Queenfish

Figures 1, 2; Tables 1, 2

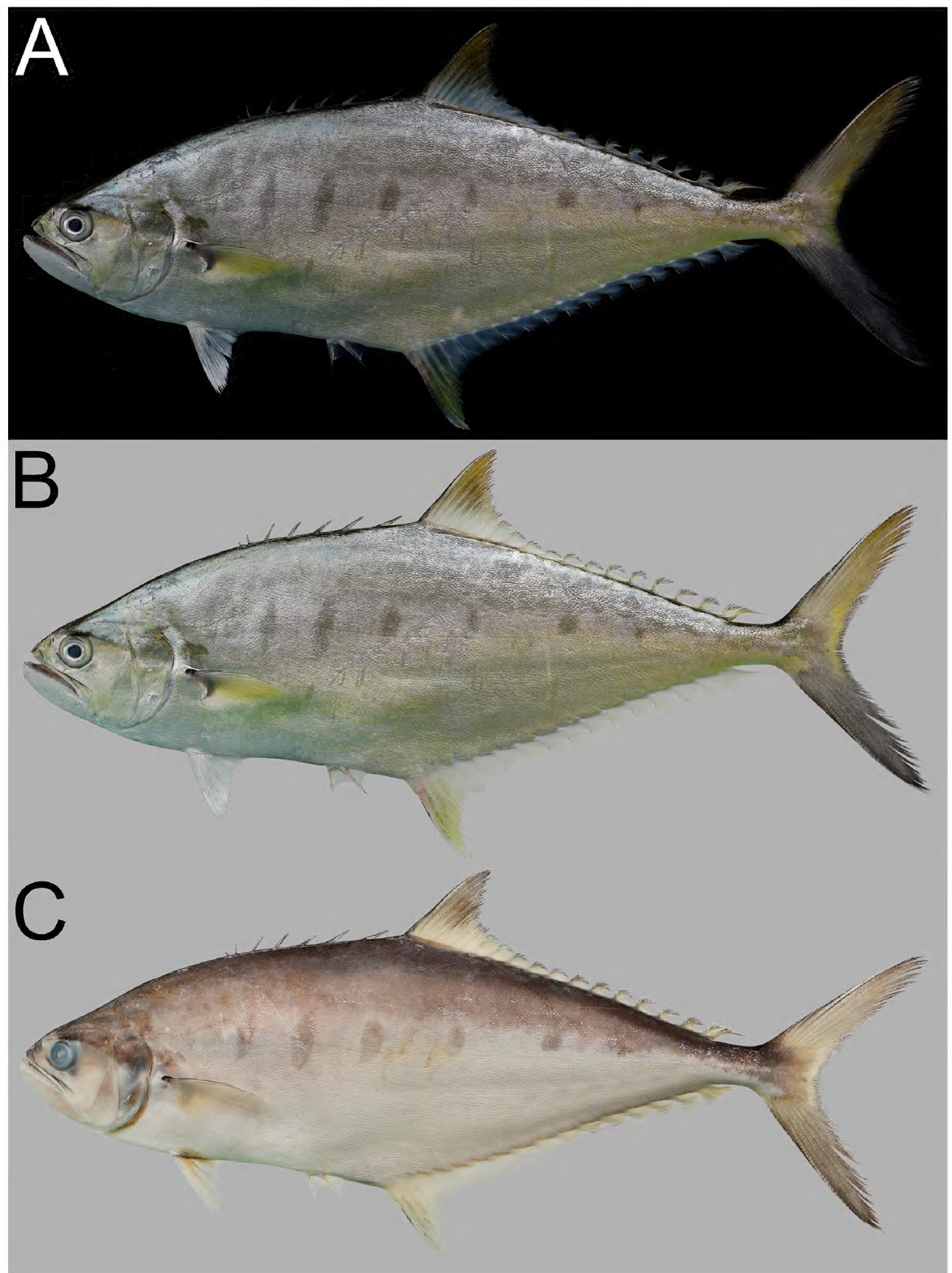
Chorinemus tala Cuvier in Cuvier and Valenciennes, 1832: 377 [Original description. Type locality: Malabar, India. Holotype: MNHN A-6588].

Chorinemus hainanensis Chu & Cheng, 1958: 317 [Original description. Type locality: Sanya, Kanchiun, Kwonghoi, and Chinglan, China].

Chorinemus toloo Cuvier in Cuvier and Valenciennes, 1832: 377 [Original description. Type locality: Malabar, India].

Eleria philippina Jordan & Seale, 1905: 774 [Original description. Type locality: Southern Negros, the Philippines].

Figure 1. *Scomberoides tala*, NMMB-P 41157, 362 mm FL. **A, B.** Fresh condition. **B.** Preserved.



Scomberoides tala (Cuvier, 1832) — Smith-Vaniz and Staiger (1973: 199) [in part]; Allen and Swainston (1988: 74) [in part, northwestern Australia]; Paxton et al. (1989: 583) [listed, Australia]; Randall et al. (1990: 165) [in part, Great Barrier Reef and Coral Sea]; Gunn (1990: 45) [in part, Australia]; Mohsin and Ambak (1996: 444) [in part, Malaysia]; Allen (1997: 116) [in part, tropical Australia and south-east Asia]; Larson and Williams (1997: 358) [listed, Darwin Harbor, Australia]; Randall et al. (1997: 165) [in part, Great Barrier Reef and Coral Sea]; Mishra and Srinivasan (1999: 245) [listed, west coast of India]; Smith-Vaniz in Carpenter and Niem (1999: 2733) [in part, western Central Pacific]; Mishra et al. (1999: 86) [listed, south Orissa, India]; Smith-Vaniz in Randall and Lim (2000: 616) [listed, South China Sea]; Iwatsuki et al. (2000: 100) [listed, Makassar, Indonesia]; Kimura and Peristiwady in Matsuura and Peristiwady (2000: 198) [in part, Lombok Island, Indonesia]; Hutchins (2001: 33) [listed, Western Australia]; Allen and Adrim (2003: 38) [listed, Indonesia]; Manilo and Bogorodsky (2003: S107) [listed, Arabian Sea]; Hoese and Gates in Hoese et al. (2006: 1165) [listed, Australia]; Kimura in Kimura et al. (2009: 124) [in part, Andaman Sea]; Miura (2012: 35) [photo record, Okinawa, Japan]; Larson et al. (2013: 124) [listed, Northern Territory, Australia]; Kimura in Yoshida et al. (2013: 120) [in part, northern gulf of Thailand]; Psomadakis et al. (2015: 227) [in part, Pakistan]; Kimura in Motomura et al. (2017: 117) [in part, the Philippines]; Suresh et al. (2018: 210) [listed, Chilika Lake, India]; Habib and Islam (2020: Supplementary table p. 16) [listed, Bangladesh, India]; Smith-Vaniz in Psomadakis et al. (2020: 430) [in part, Myanmar]; Gloerfelt-Tarp and Kailola (2022: 173) [in part, southern Indonesia and northwestern Australia]; Smith-Vaniz in Heemstra et al. (2022: 58) [in part, western Indian Ocean]; Ogata et al. (2023: 52) [specimen based record from Japan].

Figure 2. Close-up image of *Scomberoides tala*, NMMB-P 41157, 362 mm FL. **A.** Head, fresh condition. **B.** Body scales on mid-portion of body, preserved condition. Anterior to left. Figures not to scale.

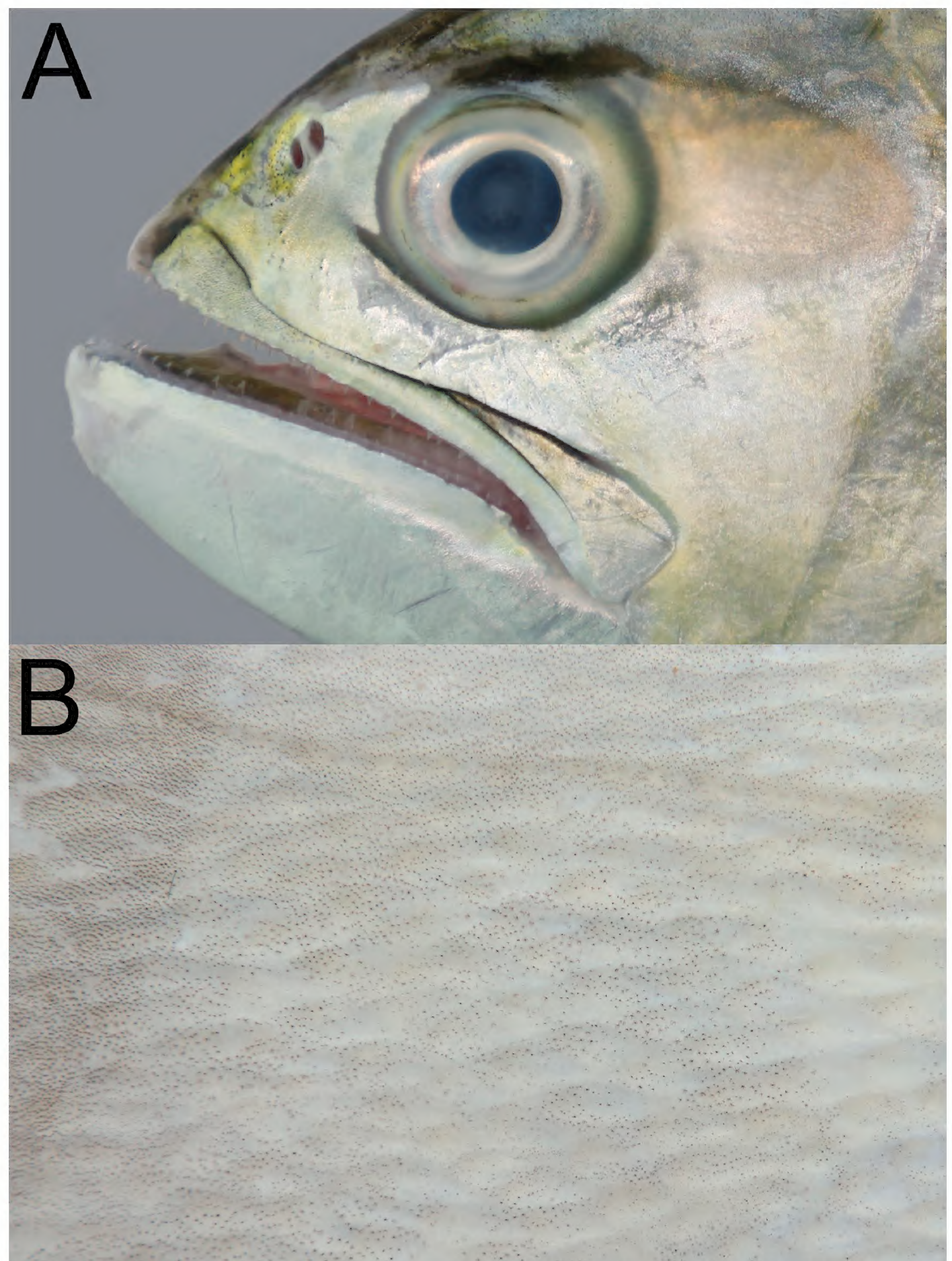


Table 1. Meristic characters of *Scomberoides tala*. Paired-fin characters were presented as left/right whenever available.

Character	This study <i>n</i> = 9	Ogata et al. 2023		Smith-Vaniz and Staiger 1973
		KPM-NI 68403	KPM-NI 71651	
Dorsal-fin elements	VI–VII-I, 18–19	VII-I, 20	VI-I, 20	VI–VII-I, 19–21
Anal-fin elements	II-I, 17–18	II-I, 18	II-I, 19	II-I, 17–19
Pectoral-fin elements	i+17–18/i+16–18	i+17	i+17	i+16–17
Pelvic-fin elements	I, 5/I, 5	I, 5	I, 5	—
Gill rakers on first arch	3+10–11=13–14	3+10=13	3+10=13	1–3+7–11=11–15

New records. TAIWAN –TAINAN • Anping fish market; ca. 22°59'46"N, 120°09'25"E; 5 Nov. 2024; T.-Y. Liu leg.; 216.9 mm FL; 1 specimen, NMMB-P 41254. KAOHSIUNG • Ke-Tzu-Liao fishing port; ca. 22°42'53"N, 120°13'12"E; 14 Oct. 2024; Y.-C. Hsu and Y. Su leg.; 362 mm FL; 1 specimen, NMMB-P 41157. Ke-Tzu-Liao fishing port; 2 Nov. 2024; K.-S. Wu, Y.-C. Hsu, Y. Su, and Y.-C. Fan leg.; 193.5 mm FL; 1 specimen, NMMB-P 41253. – PINGTUNG • Fang-Laio; ca. 22°21'47"N, 120°35'34"E; 20 Nov. 2024; Y.-C. Hsu leg.; 216.9–306 mm FL; 6 specimens, NMMB-P 41255–41260.

Comparative materials. *Scomberoides commersonnianus*: NMMB-P 41261, 195.9 mm FL, Anping fish market, 8 Nov. 2024; T.-Y. Liu leg. *Scomberoides lysan*: NMMB-P, 41262, 460 mm FL, off Nanliao fishing port (ca. 24°50'56"N, 120°55'31"E), Hsinchu, northwestern Taiwan, 10 Nov. 2024, Y.-C. Hsu leg. *Scomberoides tol*: NMMB-P 41263, 321 mm FL, collected with NMMB-P 41262.

Identification. Among the five species of *Scomberoides* (Smith-Vaniz and Staiger 1973; Abdussamad et al. 2023), the present specimens agree well with *S. tala* (in having the following: blotches on body oval and oblong (vs. rounded in *S. commersonnianus* and *S. pelagicus*; Figure 4A); posterior margin of maxilla reaching vertical through posterior margin of eye (vs. reaching beyond posterior margin of eye in *S. commersonnianus* and *S. pelagicus*); lower-jaw teeth on inner row larger than outer row (vs. teeth in inner row subequal to outer row in *S. commersonnianus*); total gill rakers on first arch 13 (vs. 21–27 in *S. lysan* and *S. tol*); scales on body oblong (vs. sharp or needle like in *S. lysan* and *S. tol*); and dorsal and anal fins not abruptly pigmented (vs. abruptly and heavily pigmented in *S. lysan* and *S. tol*; Figure 4B, C).

Description. Meristic and morphometric data are provided in Tables 1 and 2. Paired-fin characters are presented as left/right.

Dorsal-fin elements VI–VII-I, 18–19; pectoral-fin elements i (spine-like ray) + 17–18 (soft rays) = 18–19 (total)/i + 16–18 = 17–19; pelvic-fin elements I, 5/I, 5; anal-fin elements II-I, 17–18; rakers on outer face of first gill arch 3 (upper) + 10–11 (lower) = 13–14 (total).

Body fusiform, depth 2.9–3.3× in FL; body laterally compressed, width at pectoral-fin base 10.6–13.1× in FL. Head oval, length 5.1–5.5× in FL. Interorbital space convex, width 3.3–3.8× in HL. Eyes of moderate, width 3.4–3.9× in HL; its surface covered by adipose eye lid, its inner diameter 4.4–5.7× in HL.

Mouth large and oblique (Figure 2A), upper-jaw length 1.7–1.8× in HL, its posterior end reaching slightly beyond posterior margin of orbit; lower jaw extending before upper jaw. Upper jaw with single row of conical

Figure 3. Distribution map of *Scomberoides tala*. Star = present study; circle = other literature records.

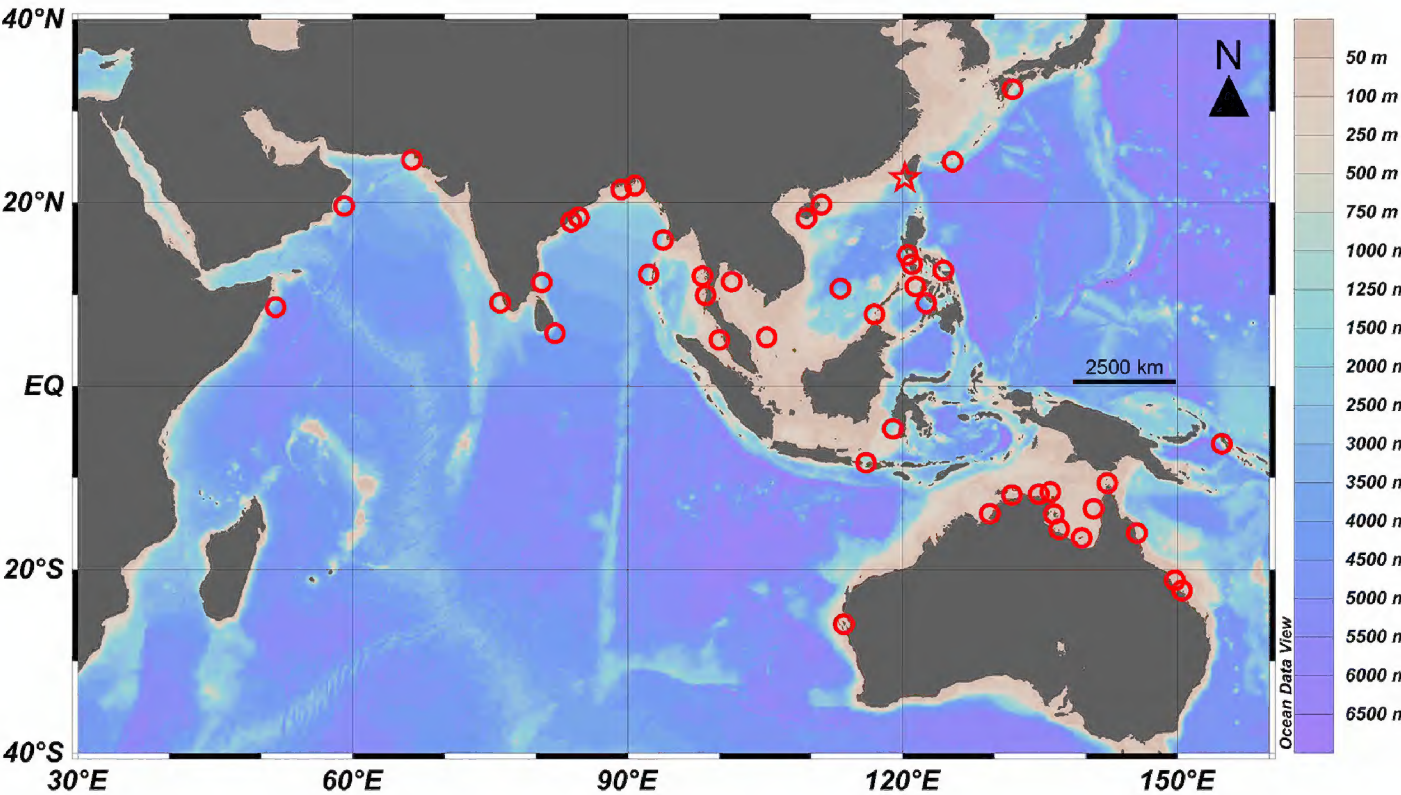


Table 2. Morphometric characters of *Scomberoides tala*. Abbreviations: A, anal fin; A2, second anal fin; D, dorsal-fin; D2, second dorsal fin; FL, fork length; HL, head length; P, pectoral-fin; SD, standard deviation; SL, standard length; V, pelvic-fin.

Character	This study <i>n</i> = 9		Ogata et al. 2023		Smith-Vaniz and Staiger 1973
			KPM-NI 68403	KPM-NI 71651	
Absolute values [mm]					
FL	193.5–362		151.9	433.0	—
SL	188.1–349		141.5	411.0	—
Relative values [%FL]	Mean (range)	SD			
HL	19.0 (18.0–19.5)	0.5	20.1	19.2	—
Snout length	5.0 (4.4–5.8)	0.4	5.9	5.0	—
Snout-postorbital length	9.2 (8.1–10.0)	0.7	9.9	9.3	—
Eye diameter	5.1 (4.9–5.5)	0.2	5.3	4.6	—
Eyelid inside diameter	3.7 (3.2–4.5)	0.4	4.3	3.4	—
Interorbital width	5.3 (4.8–5.6)	0.2	5.5	5.1	—
Upper-jaw length	10.8 (9.9–11.5)	0.5	11.7	11.2	—
Body depth D2 to A2	32.1 (30.1–34.2)	1.4	30.1	30.8	29.0–34.9
Body width at P base	8.2 (7.6–9.4)	0.5	7.5	9.2	—
Caudal-peduncle length	12.0 (10.2–13.4)	0.9	9.9	9.8	—
Caudal-peduncle depth	5.0 (4.8–5.3)	0.2	4.9	5.2	—
Predorsal length	28.9 (27.7–29.8)	0.7	28.7	31.0	—
Preanal length	37.7 (36.3–38.8)	0.9	37.8	35.5	—
Prepelvic length	23.2 (22.0–24.1)	0.8	23.9	21.0	—
D2 base length	40.1 (38.9–41.2)	0.8	40.1	42.8	—
A base length	42.2 (40.8–44.0)	0.9	41.8	42.6	—
P length	13.6 (12.8–14.3)	0.6	12.4	13.7	—
C length	22.3 (20.8–23.7)	0.9	23.3	25.3	—
V spine length	5.6 (5.1–6.5)	0.5	5.0	6.5	—
1st V soft ray length	10.2 (8.8–10.8)	0.6	9.5	9.7	—
Longest P soft ray length	12.7 (11.9–13.8)	0.6	11.7	12.5	—
Height of D lobe	14.8 (14.1–15.8)	0.6	14.1	16.5*	14.6–18.0
1st D spine length	1.3 (0.9–1.8)	0.3	1.2	1.5	—
2nd D spine length	3.0 (2.2–3.7)	0.5	2.8	2.3	—
3rd D spine length	3.8 (3.4–4.3)	0.5	3.9	2.4	—
Longest D spine length (5th)	5.1 (4.0–7.0)	1.1	6.6	3.3	—
Longest D soft ray length (1st)	15.5 (14.6–16.1)	0.5	13.0	15.8*	—
Height of A lobe	13.0 (11.7–14.2)	0.8	12.8	14.7	13.1–16.2
1st A spine length	5.3 (4.0–6.4)	0.8	6.0	3.7	—
2nd A spine length	5.9 (5.0–7.5)	1.0	6.5	4.8	—
Longest A soft ray length (1st)	13.5 (12.8–14.2)	0.5	11.7	14.0	—
Relative values [%HL]					
Snout length	26.3 (22.3–30.4)	2.1	29.5	26.2	26.1–30.1
Upper-jaw length	56.9 (54.6–59.2)	1.6	58.4	58.1	54.3–61.6

*Tip slightly damaged.

teeth extending to near posterior end of premaxilla; lower jaw with two rows of teeth, with inner row larger and fewer than outer row. Gill rakers only present on first arch; rod-shaped and laterally compressed. Gill filaments present on all four arches. Pesudobranchial filaments present. Vomer and palatine with villiform tooth patch.

Two dorsal fins, with first forming isolated spines and alternating side by side; second dorsal fin with posterior rays forming semidetached finlets. Anal fin with first two spines isolated and alternating side by side; its posterior rays forming semidetached finlets. Second anal fin slightly in advance of dorsal fin. Pectoral-fin

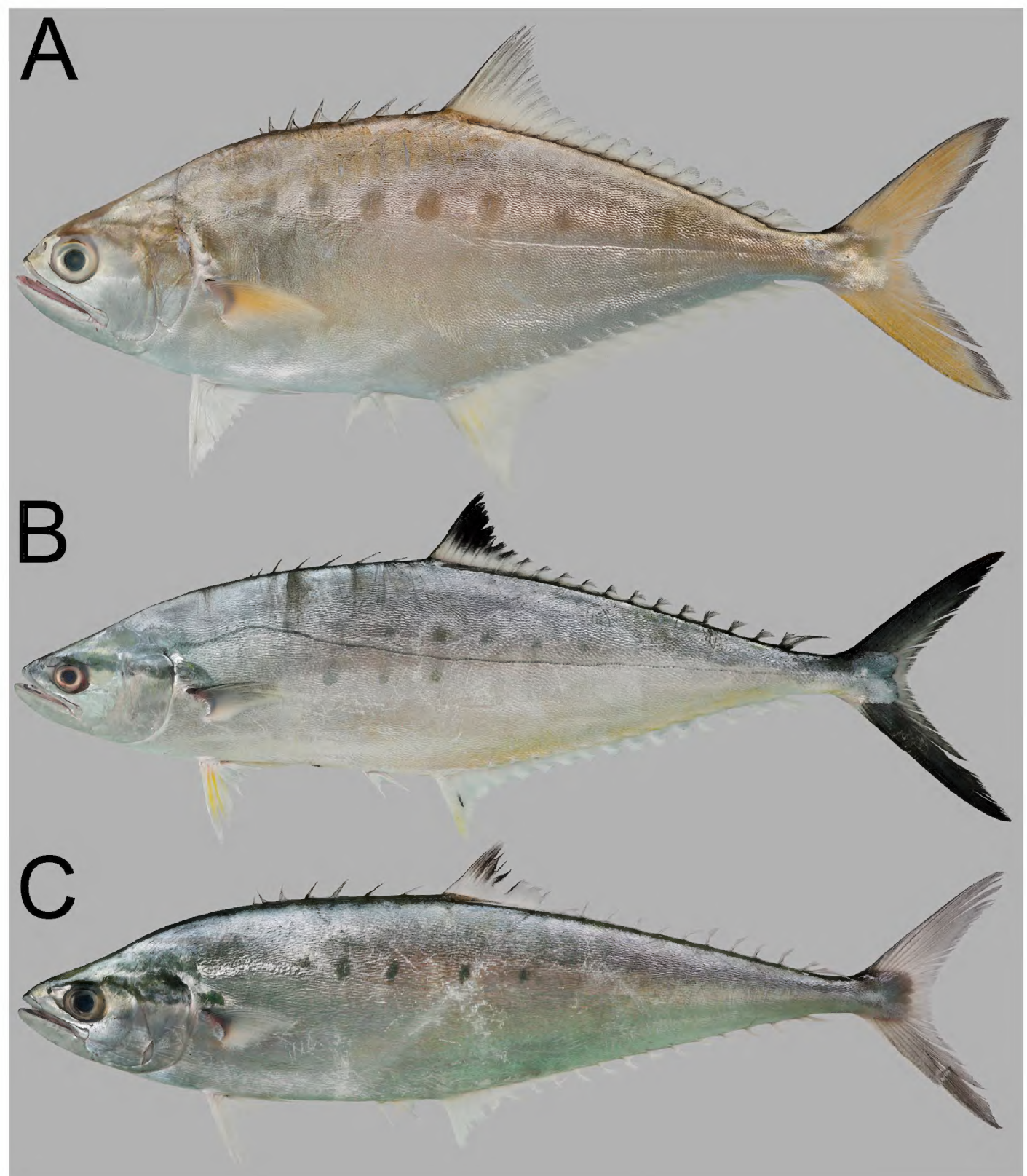


Figure 4. Fresh specimens of *Scomberoides* from Taiwan. **A.** *S. commersonnianus*, NMMB-P 41261, 195.9 mm FL. **B.** *S. lysan*, NMMB-P 41262, 460 mm FL. **C.** *S. tol*, NMMB-P 41263, 321mm FL.

length 1.4–1.5× in HL, its tip reaching to or slightly beyond vertical through anus. Pelvic-fin length 1.7–2.0× in HL, their tips not reaching anus when adpressed. Caudal fin forked, length 0.8–0.9× in HL. Anus near middle of pelvic and anal-fin origins. Body covered with oblong scales (Figure 2B) except for nape and gular region. No scutes on lateral line.

Coloration. When fresh (Figure 1A, B), body silvery and slightly yellowish or pale below posterior lateral line. Snout, operculum, and abdomen pale, slightly yellowish. Body with 6–8 grayish blotches along lateral side; their shape oval and gradually become rounded posteriorly. Dorsal-fin spines black; anterior dorsal fin grayish yellow on distal two-thirds, whereas other soft rays yellowish, with their distal ends black. Anal-fin rays pale, with distal margin of finlets slightly dusky; membranes between anterior anal-fin soft rays yellowish and scattered with melanophores; first-three soft rays with small patch of melanophores (absent in two individuals). Pelvic fin pale. Pectoral fin yellow and scattered with melanophores; its inner and upper bases black. Caudal fin grayish yellow on upper lobe and gray on lower lobe; its inner rays with dusky distal margin.

When preserved (Figure 1C), body coloration resembles that of fresh, with dorsum above lateral line grayish and abdomen pale. Caudal fin, upper pectoral-fin base, and tips of dorsal-fin rays dusky. Oral cavity slightly dusky and posterior inner operculum black.

Distribution. Known from the Indo-West Pacific (Figure 3), including Japan, the Philippines, Southeast Asia, north Australia, India, Pakistan, and East Africa (e.g. Gunn 1990; Mishra and Srinivasan 1999; Smith-Vaniz 1999, 2022; Psomadakis et al. 2015; Kimura 2017; Ogata et al. 2023). The present specimens represent the first record from Taiwan and fill the distribution gap of this species in the northwestern Pacific Ocean.

DISCUSSION

Compared to the previous data (Table 1), some minor differences in meristic counts were observed. Our specimens have fewer dorsal-fin soft rays (18 vs. 19–21 in other specimens) and more pectoral-fin rays (19 vs 17–18).

They are herein considered intraspecific variations. On the other hand, several differences were observed in the morphometric data (Table 2). Since most of the data were represented by two specimens, and all the differences were less than 3%, these differences are also considered intraspecific variations.

Previous records of *Scomberoides tala* in the western Pacific Ocean were mainly from Southeast Asia and the Philippines (Smith-Vaniz 1999; Kimura and Peristiwady 2000; Kimura 2009, 2013; Figure 3). The first photographic evidence from Okinawa, Japan, was provided by Miura (2012), and Ogata et al. (2023) later documented specimens from southern Japan, representing the northernmost record to date. Given that these records from the northwestern Pacific have only emerged in the past decade, it is suggested that the distribution range *S. tala* has shifted northward, potentially as a response to global warming (Figueira and Booth 2010; Osland et al. 2021).

Four species of *Scomberoides* are currently known from Taiwanese waters: *S. commersonnianus*, *S. lysan*, *S. tala*, and *S. tol* (Shen and Wu 2011; Hata 2019; this study; Figures 1, 4). Notably, we suggest that a recently described species, *S. pelagicus*, may also occur in Taiwan, as one of its COI sequences was obtained from Malina Bay, Philippines (Abdussamad et al. 2023). *Scomberoides pelagicus* closely resembles *S. commersonnianus* but differs in body shape, fin position, otolith morphology, and the shape of body scales (Abdussamad et al. 2023). However, further investigation is warranted, as no type specimens of *S. commersonnianus* are available (Smith-Vaniz and Staiger 1973), making it challenging to determine whether the specimens identified as *S. commersonnianus* in Abdussamad et al. (2023) truly represent this species. Additionally, Abdussamad et al. (2023) did not address the status of the four junior synonyms of *S. commersonnianus*, raising the possibility that their new species could be conspecific with one of these synonyms.

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ADDITIONAL INFORMATION

Conflict of interest

The authors declare that no competing interests exist.

Ethical statement

No ethical statement is reported.


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Author contributions

Conceptualization: YS, YCH. Formal analysis: YS. Funding acquisition: TYL. Investigation: YS, YCH. Project administration: TYL. Supervision: TYL. Visualization: YS, YCH. Writing – original draft: YS. Writing – review and editing: YCH, TYL.

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Data availability

All data that support the findings of this study are available in the main text.

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